

Figure 5



Screen Capture of the Middle School Session showing the Images and Collaborators.

Summary

Researchers and educators today need access to expensive analytical tools and technical expertise to address complex problems in today's technologically important materials, or in our ever growing need to share unique and valuable assets. A TelePresence Collaboratory provides timely and convenient access to those resources. It reduces time, travel, equipment, and personnel costs, and it can open new areas for both scientific research as well as education, making unique resources available to a wider audience. Although the ANL TPM Collaboratory is specifically focussed upon using state-of-the-art electron microscopes as testbed instrumentation, the principle is applicable to many areas:

Research and Development:

Researchers can participate in scientific investigations using unique

resources, such as the state-of-the-art electron microscopes at a government research laboratory, without being physically present at that facility. Productivity increases through timely and effective sharing of expertise, data, and instrumentation.

Industry: Manufacturers can configure demonstration equipment to be accessible via a TPM system and allow prospective customers to evaluate it from their office or home computers before they make a purchase. Service facilities can allow customers to take advantage of online consulting/service and/or diagnostics conducted by technicians located at remote sites.

Higher Education: Students have access to instruments that are not available at their home institution, allowing the widest possible use of unique and expensive facilities. If equipment is available on campus, students can consult an advisor or

non-resident expert to answer questions or diagnose problems during their actual experimental session, thus saving valuable time that might be otherwise wasted during unproductive experiments.

K-12 Schools: Middle and high school students can reach out to scientific professionals and get involved with science at an early stage in their education. Outside of research, this is one of the most exciting applications of TPM. The key to bringing the excitement of science back into the classroom is hands-on participation. TPM is one way in which a visually rich resource can be brought directly into a classroom with minimal cost to schools.

The key to understanding TelePresence Collaboration is to remember that ultimately, it is not simply the presence of instrumentation (or access to it) that produces new ideas, better students, or new science. Instead, these advances result from the collective work of individuals who learn from their interactions with others. These individuals formulate ideas, execute experiments, and exchange information, all of which expands their knowledge and understanding and perhaps solves a vexing problem or communicates an idea.

This type of work, regardless of the topic, requires access to many resources. The persistent interactive space embodied in the TPM Collaboratory is one resource that facilitates that collaboration. We have by no means created the new paradigm, but we have certainly begun the process of defining it.

References:

- **TelePresence Microscopy Collaboratory:** Proceedings of Microscopy and Microanalysis 1995, Kansas City, Pub Jones and Begall, Ed. Bailey, Ellisman, Zaluzec.
- In 1997 the **ANL TPM Collaboratory** became a part of the US Department of Energy DOE2000 program [<http://www.mcs.anl.gov/DOE2000/>].
- MBone (MultiCast BackBone) See for example: <http://www-itg.lbl.gov/MBone/> maintained by D. Agarwal

• CuSeeMe

<http://cu-seeme.cornell.edu/> or commercially from White Pine Software <http://7/20/98/www.wpine.com>

For more information, or to comment on this article, please direct your correspondence to "The Editor" at: editor@teleconferencemagazine.com